

2/9/3 (Item 3 from file: 2)

DIALOG(R) File 2:INSPEC

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6405519 INSPEC Abstract Number: A1999-24-8115C-012, B1999-12-0520B-024

Title: **Improvement of quality and electrical properties of sputtered Pb(Zr,Ti)O/sub 3/ films by wet - oxidation process**

Author(s): Song-Min Nam; Kimura, H.; Ohashi, N.; Tsurumi, T.

Author Affiliation: Dept. of Inorg. Mater., Tokyo Inst. of Technol., Yokohama, Japan

Journal: Japanese Journal of Applied Physics, Part 1 (Regular Papers, Short Notes & Review Papers) Conference Title: Jpn. J. Appl. Phys. 1, Regul. Pap. Short Notes Rev. Pap. (Japan) vol.38, no.9B p.5383-7

Publisher: Publication Office, Japanese Journal Appl. Phys,

→ Publication Date: Sept. 1999 Country of Publication: Japan

CODEN: JAPNDE ISSN: 0021-4922

SICI: 0021-4922(199909)38:9BL:5383:IQEP;1-4

Material Identity Number: F221-1999-019

Conference Title: 16th Meeting on Ferroelectric Materials and Their Applications (FMA-16)

Conference Date: 26-29 May 1999 Conference Location: Kyoto, Japan

Language: English Document Type: Conference Paper (PA); Journal Paper (JP)

Treatment: Experimental (X)

Abstract: A **wet - oxidation** process was proposed to improve the quality and electrical properties of Pb(Zr,Ti)O/sub 2/ (**PZT**) thin films prepared by the RF-magnetron sputtering technique. For the **oxidation** of metallic Pb in as-deposited **PZT** films, the **wet - oxidation** process was carried out using hydrogen peroxide solutions prior to post-annealing for crystallization. In the case of **PZT** films on Pt/Ti/SiO/sub 2//Si substrates, the density of defects observed using an optical microscope was drastically decreased by means of the **wet - oxidation** process, and the shape of polarization vs voltage hysteresis loops of **PZT** films was also improved. In the case of **PZT** films on Pt/IrO/sub 2//SiO/sub 2//Si substrates, microvoids were diminished by means of the **wet - oxidation** process. For 70 nm-thick **PZT** films on Pt/IrO/sub 2//SiO/sub 2//Si substrates, hysteresis loops could not be measured without the **wet - oxidation** process. However, the films with the **wet - oxidation** process exhibited the slim-type hysteresis loop with a remanent polarization of over 23 mu C/cm/sup 2/ even at 2V and a coercive voltage of about 0.7 V. (21 Refs)

Subfile: A B

Descriptors: annealing; crystal defects; dielectric hysteresis; dielectric polarisation; **ferroelectric** materials; **ferroelectric** thin films; lead compounds; optical microscopy; oxidation; sputter deposition; voids (solid)

Identifiers: electrical properties; sputtered Pb(Zr,Ti)O/sub 3/ films; **wet - oxidation** process; **PZT** thin films; RF-magnetron sputtering technique; metallic Pb; hydrogen peroxide solutions; post-annealing; crystallization; Pt/Ti/SiO/sub 2//Si substrates; defects; optical microscopy; polarization vs voltage hysteresis loops; Pt/IrO/sub 2//SiO/sub 2//Si substrates; microvoids; hysteresis loops; slim-type hysteresis loop; remanent polarization; coercive voltage; 2 V; 0.7 V; 70 nm; **PZT** ; Si; Pt-Ti-SiO/sub 2/-Si; Pt-IrO/sub 2/-SiO/sub 2/-Si; PbZrO3TiO3

Class Codes: A8115C (Deposition by sputtering); A7755 (Dielectric thin films); A6855 (Thin film growth, structure, and epitaxy); A8160 (Corrosion, oxidation, etching, and other surface treatments); A8140G (Other heat and thermomechanical treatments); A8140R (Electrical and magnetic properties (related to treatment conditions)); A6170 (Defects in crystals); A7730 (Dielectric polarization and depolarization effects); A7780D (Ferroelectric domain structure and effects; hysteresis); A6170Q (Inclusions and voids); B0520B (Sputter deposition); B2810F (Piezoelectric and ferroelectric materials)

05439035 E.I. No: EIP99124948151

Title: Improvement of quality and electrical properties of sputtered Pb(Zr, Ti)O₃ films by wet - oxidation process

Author: Nam, Song-Min; Kimura, Hiroyuki; Ohashi, Naoki; Tsurumi, Takaaki

Corporate Source: Tokyo Inst of Technology, Tokyo, Jpn

Source: Japanese Journal of Applied Physics, Part 1: Regular Papers and Short Notes and Review Papers v 38 n 9 B 1999. p 5383-5387

Publication Year: 1999

CODEN: JAPNDE ISSN: 0021-4922

Language: English

Document Type: JA; (Journal Article) -- Treatment: -X; -(Experimental)

Journal Announcement: 0002W1

Abstract: A **wet - oxidation** process was proposed to improve the quality and electrical properties of Pb(Zr, Ti)O₃ (**PZT**) thin films prepared by the RF-magnetron sputtering technique. For the **oxidation** of metallic Pb in as-deposited **PZT** films, the **wet - oxidation** process was carried out using hydrogen peroxide solutions prior to postannealing for crystallization. In the case of **PZT** films on Pt/Ti/SiO₂/Si substrates, the density of defects observed using an optical microscope was drastically decreased by means of the **wet - oxidation** process, and the shape of polarization vs voltage hysteresis loops of **PZT** films was also improved. In the case of **PZT** films on Pt/IrO₂/SiO₂/Si substrates, microvoids were diminished by means of the **wet - oxidation** process. For 70 nm-thick **PZT** films on Pt/IrO₂/SiO₂/Si substrates, hysteresis loops could not be measured without the **wet - oxidation** process. However, the films with the **wet - oxidation** process exhibited the slim-type hysteresis loop with a remanent polarization of over 23 $\mu\text{C}/\text{cm}^2$ even at 2 V and a coercive voltage of about 0.7 V. (Author abstract) 21 Refs.

Descriptors: Dielectric films; **Ferroelectric** materials; Thin films; Lead compounds; Magnetron sputtering; Oxidation; Hydrogen peroxide; Hysteresis; Polarization; Electric potential

Identifiers: Lead zirconate titanate; **Wet - oxidation** process

Classification Codes:

708.1 (Dielectric Materials); 804.2 (Inorganic Components); 813.1 (Coating Techniques); 802.2 (Chemical Reactions); 701.1 (Electricity: Basic Concepts & Phenomena); 701.2 (Magnetism: Basic Concepts & Phenomena)

708 (Electric & Magnetic Materials); 804 (Chemical Products); 813 (Coatings & Finishes); 802 (Chemical Apparatus & Plants); 701 (Electricity & Magnetism)

70 (ELECTRICAL ENGINEERING); 80 (CHEMICAL ENGINEERING); 81 (CHEMICAL PROCESS INDUSTRIES)

2/9/15 (Item 6 from file: 8)

DIALOG(R) File 8: Ei Compendex(R)

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05241785 E.I. No: EIP99034593214

Title: Catalytic hydrogenation of CO over the doped perovskite oxide YBa//2Cu//3O//7// minus //x catalysts

Author: Dursun, Gulbeyi; Winterbottom, John M.

Corporate Source: Univ of Birmingham, Birmingham, Engl

Source: Journal of Chemical Technology and Biotechnology v 73 n 4 Dec 1998. p 389-397

Publication Year: 1998

CODEN: JCTBED ISSN: 0268-2575

Language: English

Document Type: JA; (Journal Article) Treatment: X; (Experimental)

Journal Announcement: 9904W4

Abstract: **Perovskite** oxide structured YBa//2Cu//3O//7// minus //x (YBCO) has been first prepared by carbonate precipitation and then modified with palladium or ruthenium by impregnation on the **perovskite** oxide, while cobalt was co-precipitated simultaneously in the same pH range with **perovskite** oxide. After characterization the catalysts were used in the

2/9/22 (Item 1 from File: 94)

DIALOG(R) File 94:JICST-EPlus

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05030025 JICST ACCESSION NUMBER: 01A0919373 FILE SEGMENT: JICST-E

**Crystal Structures in proton conductor BaCe_{1-x}Y_xO₃-.DELTA.(x=0-0.3)
determinaed by neutron diffraction.**

TAKEUCHI KEN (1); LOONG C-K (1); RICHARDSON J W JR (1); DORRIS S E (1);

BALACHANDRAN U (1)

(1) Argonne National Lab., Illinois, Usa

Kotai Ionikusu Toronkai Koen Yoshishu(Extended Abstracts. Symposium on
Solid State Ionics in Japan), 2000, VOL.26th, PAGE.148-149, FIG.1,

REF.3

JOURNAL NUMBER: L1398AAI

UNIVERSAL DECIMAL CLASSIFICATION: 548.736:546.3-31

LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan

DOCUMENT TYPE: Conference Proceeding

ARTICLE TYPE: Short Communication

MEDIA TYPE: Printed Publication

ABSTRACT: The crystal structures and phase transitions in
BaCe_{0.8}Y_{0.2}O₃-.DELTA.(x=0-0.3) that occur in response to heat-treatment
in **oxidizing**, reducing, and **water**-vapor-containing atmospheres were
determined by neutron powder diffraction at room temperature.

Single-phase BaCe_{0.8}Y_{0.2}O₃-.DELTA. can be synthesized by O₂-annealing
samples prepared by a solid-state reaction method, wherein they
crystallize into **perovskite**-type structures(orthorhombic Pmcn for x.
LEQ.0.1 and rhombohedral R3c for x. GEQ.0.15). Within the composition
range of 0.15.LEQ.x. LEQ.0.25, where maximum total conductivity is
observed, the rhombohedral structure converts partially to a monoclinic
I2/m structure upon exposure to water- or H₂-containing
atmospheres(including laboratory air) at elevated temperatures. This
study may suggest a correlation between the crystal structures,
particularly the I2/m phase, and the proton transport properties.
(author abst.)

DESCRIPTORS: solid electrolyte; neutron diffraction; crystal structure;
barium compound; cerium compound; yttrium compound; oxide; **perovskite**
type crystal; rhombic system; trigonal system; electrical conductivity;
ionic conduction; structural phase transition; annealing; water vapor;
oxidation; reduction(reaction); proton; structure analysis

IDENTIFIERS: proton conduction; crystal structure analysis

BROADER DESCRIPTORS: electrolyte; matter; neutron scattering; scattering;
particle diffraction; diffraction; coherent scattering; structure;
alkaline earth metal compound; rare earth element compound; transition
metal compound; chalcogenide; oxygen group element compound; oxygen
compound; crystal; solid(matter); crystal system; ratio; transport
coefficient; coefficient; electric conduction; electrical property;
phase transition; heat treatment; treatment; gas; chemical reaction;
nucleon; baryon; hadron; elementary particle; analysis

CLASSIFICATION CODE(S): BK07020Y

2/9/23 (Item 2 from file: 94)

DIALOG(R) File 94:JICST-EPlus

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04476405 JICST ACCESSION NUMBER: 99A0999512 FILE SEGMENT: JICST-E

**Improvement of Quality and Electrical Properties of Sputtered Pb(Zr, Ti)O₃
Films by Wet - Oxidation Process.**

NAM S-M (1); KIMURA H (1); OHASHI N (1); TSURUMI T (1)

(1) Tokyo Inst. Technol., Tokyo, Jpn

Jpn J Appl Phys Part 1, 1999, VOL.38,NO.9B, PAGE.5383-5387, FIG.8, TBL.1,

REF.21

JOURNAL NUMBER: G0520BAE ISSN NO: 0021-4922

UNIVERSAL DECIMAL CLASSIFICATION: 537.226.4 539.23:54-31

LANGUAGE: English COUNTRY OF PUBLICATION: Japan

DOCUMENT TYPE: Journal

Handwritten signature and "DUPLICATE" stamp.

ARTICLE TYPE: Original paper
MEDIA TYPE: Printed Publication

ABSTRACT: A **wet - oxidation** process was proposed to improve the quality and electrical properties of $\text{Pb}(\text{Zr}, \text{Ti})\text{O}_3$ (**PZT**) thin films prepared by the RF-magnetron sputtering technique. For the **oxidation** of metallic Pb in as-deposited **PZT** films, the **wet - oxidation** process was carried out using hydrogen peroxide solutions prior to postannealing for crystallization. In the case of **PZT** films on Pt/Ti/SiO₂/Si substrates, the density of defects observed using an optical microscope was drastically decreased by means of the **wet - oxidation** process, and the shape of polarization vs voltage hysteresis loops of **PZT** films was also improved. In the case of **PZT** films on Pt/IrO₂/SiO₂/Si substrates, microvoids were diminished by means of the **wet - oxidation** process. For 70 nm-thick **PZT** films on Pt/IrO₂/SiO₂/Si substrates, hysteresis loops could not be measured without the **wet - oxidation** process. However, the films with the **wet - oxidation** process exhibited the slim-type hysteresis loop with a remanent polarization of over 23 .MU.C/cm² even at 2 V and a coercive voltage of about 0.7 V. (author abst.)

DESCRIPTORS: ferroelectrics; **PZT**; dielectric thin film; magnetron sputtering; thin film growth; hydrogen peroxide; annealing; crystallization; surface defect; dielectric polarization; hysteresis; oxidation; wet method

IDENTIFIERS: **wet oxidation**

BROADER DESCRIPTORS: dielectrics; dielectric material; material; zirconate; oxoate; oxygen compound; oxygen group element compound; zirconium compound; 4A group element compound; transition metal compound; titanate; titanium compound; lead compound; carbon group element compound; thin film; membrane and film; sputtering; peroxide(inorganic); oxide; chalcogenide; hydrogen compound; heat treatment; treatment; modification; defect; polarization(phenomenon); polarization; irreversible process; process; chemical reaction; operation(processing)

CLASSIFICATION CODE(S): BM05030B; BK14050P

2/9/24 (Item 3 from file: 94)

DIALOG(R) File 94:JICST-EPlus

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02987841 JICST ACCESSION NUMBER: 96A0704964 FILE SEGMENT: JICST-E

Oxidative coupling reaction of methane using water as an oxidant by tin-based oxides.

EBARA TOSHIYA (1); OMATA KOJI (1); ISHII YASUNORI (1); YAMADA MUNEOYOSHI (1)
(1) Tohoku Univ., Fac. of Eng.

Sekiyu Gakkai Nenkai Koen Yoshi, 1995, VOL.38th, PAGE.110-111, FIG.1,
TBL.1, REF.2

JOURNAL NUMBER: L2066AAJ

UNIVERSAL DECIMAL CLASSIFICATION: 661.71/.78 544.47:544.344

LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan

DOCUMENT TYPE: Conference Proceeding

ARTICLE TYPE: Short Communication

MEDIA TYPE: Printed Publication

ABSTRACT: Ethane generation and catalyst regeneration was carried out by alternately supplying methane and water into an oxide catalyst-filled fixed reactor at 750.DEG.C., and the catalytic activity was examined. Among the oxides of Sn, Ce, and V which have thermodynamical potential for the **oxidation** with **water**, Sn showed activity in the both reaction. Among the Sn oxides mixed with Mg, Ca, and Sr oxides, a **perovskite** type crystal of SrSnO_3 showed the highest reaction activity.

DESCRIPTORS: coupling reaction; oxidizing agent; water; catalytic activity; transition metal catalyst; tin oxide; oxidation-reduction reaction; additive effect; strontium compound; regeneration; oxidative coupling; catalyst regeneration; alkane

BROADER DESCRIPTORS: chemical reaction; activity; property; metal catalyst; catalyst; metal oxide; oxide; chalcogenide; oxygen group element compound; oxygen compound; tin compound; carbon group element compound;

Country of Publication: United States

Language: English

A high performance electrochemical reactor for the partial oxidation of CH SUB 4 into synthesis gas has been developed by fixing powder catalysts on the anode surface for the natural gas conversion. A powdered catalyst of Ni SUB 1 SUB . SUB 0 / Ca SUB 0 SUB . SUB 8 Sr SUB 0 SUB . SUB 2 TiO SUB 3 fixed by a gold paste has excellent catalytic activity without significant deactivation by the carbon deposition. The conversion of CH SUB 4 at 1173 K is 38.8% with the selectivity to CO of 98.9%. The advantage of this system is the separation of N SUB 2 and O SUB 2 in the cathode chamber when using air as the oxidant gas instead of pure oxygen. Furthermore, an electric power density of 14.5 mW cm SUP - SUP 2 has been obtained by this system at 1173 K. The amount of carbon deposition over the Ni SUB 1 SUB . SUB 0 / Ca SUB 0 SUB . SUB 8 Sr SUB 0 SUB . SUB 2 TiO SUB 3 is ten times lower than that over the Ni-yttria-stabilized zirconia cermet of a typical anode material in the solid oxide fuel cell system or the typical Ni/Al SUB 2 O SUB 3 catalyst for CH SUB 4 conversion. This is attributed to the oxidation of carbon deposits by the lattice oxygen species that migrated from the oxide to the Ni-Ca SUB 0 SUB . SUB 8 Sr SUB 0 SUB . SUB 2 TiO SUB 3 boundary. The synthesis gas is considered to be formed not only by the **steam** reforming of CH4 including the complete **oxidation** but also by the direct oxidation of CH SUB 4 .

English Descriptors: Experimental study; Catalytic reaction; Partial oxidation; Hydrocarbon; Methane-ENT; Supported catalyst; **Perovskite** type compound; Nickel-ACT; Titanium oxide-SUB; Strontium oxide-SUB; Calcium oxide-SUB; Reaction mechanism; Kinetic parameter; Rate constant; Catalyst activity; Catalyst selectivity; Electrochemical reactor; X ray diffraction

Broad Descriptors: Alkaline earth metal Compounds; Transition metal Compounds; Metal alcalinoterreux Compose; Metal transition Compose; Metal alcalino-terreo Compuesto; Metal transicion Compuesto

French Descriptors: Etude experimentale; Reaction catalytique; Oxydation partielle; Hydrocarbure; Methane-ENT; Catalyseur sur support; Perovskites; Nickel-ACT; Titane oxyde-SUB; Strontium oxyde-SUB; Calcium oxyde-SUB; Mecanisme reaction; Parametre cinetique; Constante vitesse; Activite catalytique; Selectivite catalyseur; Reacteur electrochimique; Diffraction RX

Classification Codes: 001C01A03B

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2/9/35 (Item 9 from file: 144)

DIALOG(R) File 144:Pascal

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14377840 PASCAL No.: 00-0030519

Improvement of quality and electrical properties of sputtered Pb(Zr,<hair thin space>Ti)O SUB 3 films by wet - oxidation process

NAM Song-Min; KIMURA Hiroyuki; OHASHI Naoki; TSURUMI Takaaki

Department of Inorganic Materials, Graduate School of Science and Engineering, Tokyo Institute of Technology, 2-12-1, Ookayama, Meguro-ku, Tokyo 152-8552, Japan

Journal: Japanese Journal of Applied Physics, Part I : Regular papers, short notes & review papers, 1999-09, 38 (9B) 5383-5387

ISSN: 0021-4922 CODEN: JAPNDE Availability: INIST-9959

Document Type: P (Serial); C (Conference Proceedings) ; A (Analytic)

Country of Publication: United States

Language: English

A **wet - oxidation** process was proposed to improve the quality and electrical properties of Pb(Zr,<hair thin space>Ti)O SUB 3 (**PZT**) thin films prepared by the RF-magnetron sputtering technique. For the **oxidation** of metallic Pb in as-deposited **PZT** films, the **wet - oxidation** process

DUPLICATE

was carried out using hydrogen peroxide solutions prior to postannealing for crystallization. In the case of **PZT** films on **Ti/SiO SUB 2 /Si** substrates, the density of defects observed using an optical microscope was drastically decreased by means of the **wet - oxidation** process, and the shape of polarization vs voltage hysteresis loops of **PZT** films was also improved. In the case of **PZT** films on **Pt/IrO SUB 2 /SiO SUB 2 /Si** substrates, microvoids were diminished by means of the **wet - oxidation** process. For 70 nm-thick **PZT** films on **Pt/IrO SUB 2 /SiO SUB 2 /Si** substrates, hysteresis loops could not be measured without the **wet - oxidation** process. However, the films with the **wet - oxidation** process exhibited the slim-type hysteresis loop with a remanent polarization of over 23 $\mu\text{C}/\text{cm}^2$ even at 2 V and a coercive voltage of about 0.7 V. (c) 1999 Publication Board, Japanese Journal of Applied Physics.

English Descriptors: Experimental study; Measuring methods; **Ferroelectric** thin films; Lead compounds; Zirconium compounds; Titanium compounds; Oxygen compounds; Sputter deposition; Oxidation; Dielectric hysteresis; Dielectric polarization; Crystal microstructure; Crystal defects

French Descriptors: 7755; 8165M; 7780D; 8115C; Etude experimentale; Methode mesure; Couche mince ferroelectrique; Plomb compose; Zirconium compose; Titane compose; Oxygene compose; Depot pulverisation; Oxydation; Hysteresis dielectrique; Polarisation dielectrique; Microstructure cristalline; Defaut cristallin

Classification Codes: 001B70G55; 001B80A65; 001B70G80D; 001B80A15C

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DIALOG(R) File 144:Pascal

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13931746 PASCAL No.: 99-0113964

Simultaneous generation of synthesis gas and electric power by internal reforming fuel cells utilizing LaGaO SUB 3 based electrolytes

Solid state ionics - 1997

YAMADA T; HIEI Y; AKBAY T; ISHIHARA T; TAKITA Y

LIEBERT Bruce E, ed; WEPPNER Werner, ed

Department of Applied Chemistry, Faculty of Engineering, Oita University, Dannoharu 700, Oita 870-11, Japan

University of Hawaii, 2540 Dole St., Rm. 302, Honolulu, Hawaii 96822, United States; Lehrstuhl fuer Sensorik und Festkorper-Ionik, Technische Fakultaet der Christian-Albrechts-Universitaet, Kaiserstrasse 2, 24143 Kiel, Germany

International Society for Solid State Ionics, International.

SSI-11: International Conference on Solid State Ionics, 11 (Honolulu, Hawaii USA) 1997-11-16

Journal: Solid state ionics, 1998, 113-15 253-258

ISSN: 0167-2738 CODEN: SSIOD3 Availability: INIST-18305; 354000073650350350

No. of Refs.: 5 ref.

Document Type: P (Serial); C (Conference Proceedings) ; A (Analytic)

Country of Publication: Netherlands

Language: English

A novel solid oxide fuel cell (SOFC) utilizing partial oxidation of methane ($\text{CH}_4 + \frac{1}{2}\text{O}_2 = \text{CO} + \text{H}_2$) as internal reforming reaction was investigated in the present study. Large electric power as well as CO-H_2 mixture with molar ratio of 2 were obtained by applying **LaGaO SUB 3 perovskite** as electrolyte. Although the open circuit potential decreased, the maximum power density increased by doping a small amount of Co to the **LaGaO SUB 3** electrolyte. In particular, the increase in the power density at 1073 K was significant. Increasing the amount of doped Co monotonically enhanced the hole conduction resulting in a decrease in the open circuit potential and an increase on the amount of leaked oxygen which results in diminished electric power. Consequently, it became clear

by the formation of sulfate groups on active sites of the catalyst, was modelled in the second part of this project. The suggested general model takes into account experimental conditions, based on a reaction mechanism involving sub-products of mercaptan oxidation (SO_2 , SO_3) as the poison precursors. A more empirical part of this model was introduced in order to simulate more complicated phenomena (effect of **water steam** or of different **oxidation** modes, using adsorbed oxygen or that from the lattice network, on the deactivation process).

The third part of this work deals with the simulation of the deactivation for an isothermal tubular reactor. An implicit Crank-Nicholson method and a non-equidistant space grid was used.

Finally, the last part of this work was devoted to an attempt to regenerate the deactivated catalysts. (Abstract shorted by UMI.)

2/9/21 (Item 2 from file: 35)

DIALOG(R) File 35:Dissertation Abs Online

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0968918 ORDER NO: AAD87-20200

SILICON DEVICE DEVELOPMENT FOR SILICON/ PLZT SPATIAL LIGHT MODULATORS

Author: ESENER, SADIK CAVIT

Degree: PH.D

Year: 1987

Corporate Source/Institution: UNIVERSITY OF CALIFORNIA, SAN DIEGO (0033)

Source: VOLUME 48/08-B OF DISSERTATION ABSTRACTS INTERNATIONAL.

PAGE 2410. 294 PAGES

Descriptors: ENGINEERING, ELECTRONICS AND ELECTRICAL

Descriptor Codes: 0544

A new optoelectronic technology based on the integration of silicon and **PLZT** for the realization of spatial light modulators has been investigated. The potentials of this technology have been analyzed based on considerations such as thermal dissipation, switching energy, resolution, dynamic range, sensitivity and device configuration.

Different integration techniques for combining silicon and **PLZT** including hybrid flip-chip bonding of silicon phototransistors and **PLZT** modulators, laser crystallization of silicon on **PLZT** and magnetron sputtering of **PLZT** on silicon on sapphire, are proposed and discussed.

2-D and 1-D flip-chip bonded optical gate arrays have been fabricated to demonstrate the feasibility of Si/ **PLZT** SLMs. We have shown that the flip-chip bonding of silicon and **PLZT** can be used to fabricate high performance 1-D SLMs.

The integration of silicon and **PLZT** on a single substrate dictates the use of thin film silicon with short carrier lifetime for light detection. In order to achieve photogain and to drive **PLZT** light modulators, a new phototransistor called the Field and Light Injection Controlled Punch-Through Transistor (FLIC-PTT) has been proposed, fabricated and characterized. In order to explain and model the behavior of these devices a simple analytical theory has been developed describing the carrier distribution and the current flow in a punch-through structure under low level diffusion limited injection conditions. Recombination-generation effects have also been included in the theory to account for the photogain observed in punch-through devices. This theory is general under the assumed conditions and can be applied to other punch-through devices. In this work the developed theory has been applied to model the d.c., a.c., and noise behavior of the FLIC-PTTs. The models were also verified experimentally. FLIC-PTTs were then used to design and implement optically activated electrically reset latch circuits that can be used to realize optical thresholding and memory SLMs.

Since **PLZT** cannot sustain high processing temperatures, novel low temperature silicon device fabrication techniques such as laser assisted simultaneous crystallization and diffusion and low temperature **pyrogenic oxidation** have been developed. Transistors were fabricated using these techniques on silicon on **PLZT**. (Abstract shortened with permission of author.)